

# Unit 2: Linear Motion

## Free Fall

Free Fall: Object falling \_\_\_\_\_



Calculating velocity of an object in free fall:

$$v_f = v_i + gt$$

$v_f$  = final velocity (m/s)

$v_i$  = initial velocity (m/s)

$g$  = acceleration due to gravity ( $9.81 \text{ m/s}^2$ )

$t$  = time falling (s)

### Practice Problems:

1. You drop a marble from the top of the school. It falls for a total of 3.5 seconds. How fast was the marble going after 3.5 seconds?

2. You drop a penny from the top of a building. The penny falls for 2.4 seconds. How fast was the penny going after 2.4 seconds?

Calculating distance traveled of an object in free fall:

$$x = (1/2)gt^2$$

x = distance (m)

g = acceleration due to gravity ( $9.81 \text{ m/s}^2$ )

t = time falling (s)

Practice Problems:

1. You are at the top of a large building and want to find out how tall it is. You drop a ball from the top and notice it took 4.5 seconds to hit the ground. How tall is the building?

2. You are at the top of Burj Khalifa, the tallest building in the world. You are trying to impress your date by showing how to find the height of the building using a marble. You then drop a marble and notice it takes 12.8 seconds to hit the ground. How tall is the building?